

User manual

OLCT 60

Fixed Point Gas Monitor



Part Number: NPO60GB
Revision: C.3

OLDHAM
The Fixed Gas Detection Experts

Copyright © 2015 by Oldham S.A.S.

All rights reserved. No reproduction of all or part of this document, in any form, is permitted without the written consent of Oldham S.A.S..

All of the information that is provided in this document is accurate to the best of our knowledge.

As a result of continuous research and development, the specifications of this product may be changed without prior notice.

Oldham S.A.S.

Rue Orfila

Z.I. Est – C.S. 20417

F – 62027 ARRAS Cedex

Tel: +33 (0)3 21 60 80 80

Fax: +33 (0)3 21 60 80 00

email: info@oldhamgas.com

web: www.oldhamgas.com

Contents

Chapter 1 Overview	7
Purpose	7
Operating principle	8
Composition of the Detector.....	9
External view	10
Internal view	12
Labels and pictograms	12
Visual indication	13
 Chapter 2 Installation	 17
Regulations and conditions of use	17
Necessary equipment	17
Location of the detector.....	17
Detector positioning	18
Electrical Specifications	20
Connecting cable	20
Cable connection	21
Scope of use	25
Transfer curve	25
 Chapter 3 Commissioning and operating modes	 27
Purpose of control	27
Necessary equipment	27
Commissioning.....	28
Stabilization time	28
Display of the gas measurement.....	29
Checking Zero	30
Checking gas sensitivity	31
 Chapter 4 Preventive maintenance	 33
Maintenance schedule	33
Actions.....	34
 Chapter 5 Maintenance	 35
Possible errors	35
Replacing sensor block (Explo, O ₂ , Tox, XPIR).....	36
Replacing the OLCT IR – integrated version	37

Replacing the OLCT IR – remote version 37

Initialization of the sensor block 38

Zeroing and sensitivity adjustment (calibration) 40

Adjusting the optical zero (Ir-0) 45

Applicable coefficients for explosive gas calibration 47

Checking the line current 50

Chapter 6 | Accessories 51

Chapter 7 | Spare parts 53

Explosionproof sensor block 53

Intrinsically safe sensors 55

Chapter 8 | Declaration of EC Conformity 57

Chapter 9 | Technical Specifications 61

Dimensional characteristics 61

Complete detector 63

Measuring sensors 65

Chapter 10 | Special instructions for use in explosive environments and functional safety 67

General comments 67

Metrological performance for the detection of flammable gases or oxygen 67

Threaded joints 68

Functional Safety 68

Reliability data 68

Chapter 11 | Fault and error codes 71

Errors (*E xx*) 71

Faults (*dEF xx*) 71

Thank you for choosing this OLDHAM instrument.

All of the necessary actions have been taken to ensure your complete satisfaction with this equipment.

It is important that you read this entire manual carefully and thoroughly.

Limitation of Liability

- OLDHAM shall not be held responsible for any damage to the equipment or for any physical injury or death resulting in whole or in part from the inappropriate use or installation of the equipment, non-compliance with any and all instructions, warnings, standards and/or regulations in force.
- No business, person or legal entity may assume responsibility on behalf of OLDHAM, even though they may be involved in the sale of OLDHAM products.
- OLDHAM shall not be responsible for any direct or indirect damage, or any direct or indirect consequence, resulting from the sale and use of any of its products **UNLESS SUCH PRODUCTS HAVE BEEN SELECTED BY OLDHAM ACCORDING TO THE APPLICATION.**

Ownership clauses

- The drawings, specifications, and information herein contain confidential information that is the property of OLDHAM.
- This information shall not, either in whole or in part, by physical, electronic, or any other means whatsoever, be reproduced, copied, divulged, translated, or used as the basis for the manufacture or sale of OLDHAM equipment, or for any other reason **without the prior written consent of OLDHAM.**

Warnings

- This is not a contractual document. In the best interest of its customers and with the aim of improving performance, **OLDHAM** reserves the right to alter the technical features of its equipment without prior notice.
- **READ THESE INSTRUCTIONS CAREFULLY BEFORE THE FIRST USAGE:** these instructions should be read by all persons who have or will have responsibility for the use, maintenance, or repair of the instrument.
- This instrument shall only be deemed to be in conformance with the published performance if used, maintained, and repaired in accordance with the instructions of OLDHAM, by OLDHAM personnel, or by personnel authorized by OLDHAM.

Warranty

- Under normal conditions of use and on return to the factory, parts and workmanship are guaranteed for 2 years, excluding consumables such as sensors, filters, etc.

Disposal of the equipment



European Union only. This symbol indicates that, in conformity with DEEE Directive (2002/96/EC) and according to local regulations, this product may not be discarded together with household waste.

It must be disposed of in a collection area that is set aside for this purpose, for example at a site that is officially designated for the recycling of electrical and electronic equipment (EEE) or a point of exchange for authorized products in the event of the acquisition of a new product of the same type.

Chapter 1 | Overview

Purpose

OLCT 60 gas detectors are 4-20mA and 3-wire transmitters designed for measuring combustibile and toxic gases as well as oxygen.

OLCT 60 is available in two versions:

- Flameproof certified enclosure along with flameproof certified sensor block. **This version is listed as OLCT 60d.**
- Flameproof certified enclosure along with intrinsically safe certified sensor block. This version is available for electrochemical sensors only. **This version is listed as OLCT 60id.**

Available versions are listed below.

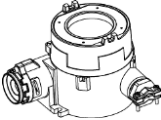
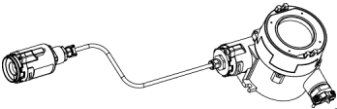
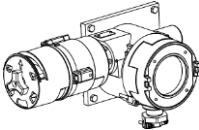
	OLCT 60d	OLCT 60id
Catalytic sensor		
Electrochemical sensor		
XPIR Infrared sensor		
OLCT IR Infrared sensor		

Table 1: Comparison of OLCT 60 detectors

Each version features two options:

- OLCT 60 version with on-board sensor. The sensor can either be flameproof or intrinsically safe certified depending on the version of the detector.
- OLCT 60D version with remote sensor. The sensor can either be flameproof or intrinsically safe certified depending on the version of the detector.

Available combinations are listed below.

Name	Description	Illustration
OLCT 60	Flameproof enclosure with on-board sensor (FLP or IS*).	
OLCT 60D	Flameproof enclosure with remote sensor 15m (FLP or IS*).	
OLCT 60 / OLCT IR	Flameproof enclosure with on-board infrared sensor type OLCT IR.	
OLCT 60D / OLCT IR	Flameproof enclosure with remote infrared transmitter type OLCT IR.	

(*) FLP stands for flameproof, IS stands for intrinsically safe. The IS version is distinguished - among other features - by the color of its housing which is blue. FLP versions are unpainted stainless steel.

Operating principle

The sensor converts the target gas into current. The current value is amplified, temperature compensated, linearized, and converted to a 4-20 mA signal proportional to the gas concentration and then conveyed through a connecting cable to a centralization system (gas controller or PLC).

Sensor type depends on the gas to be detected and the version of OLCT 60 as shown in Table 1: Comparison of OLCT 60 detectors on page 7.

Composition of the Detector

OLCT 60 detectors contain the following parts:

Id.	Description
1.	Label
2.	Cover
3.	Display board
4.	Terminal board
5.	On-board sensor
6.	Enclosure
7.	M25 cable gland (until August 2014)
8.	Remote sensor
9.	Cable for remote sensor
10.	Adapter
11.	On-board OLCT IR infrared sensor
12.	Remote OLCT IR infrared transmitter

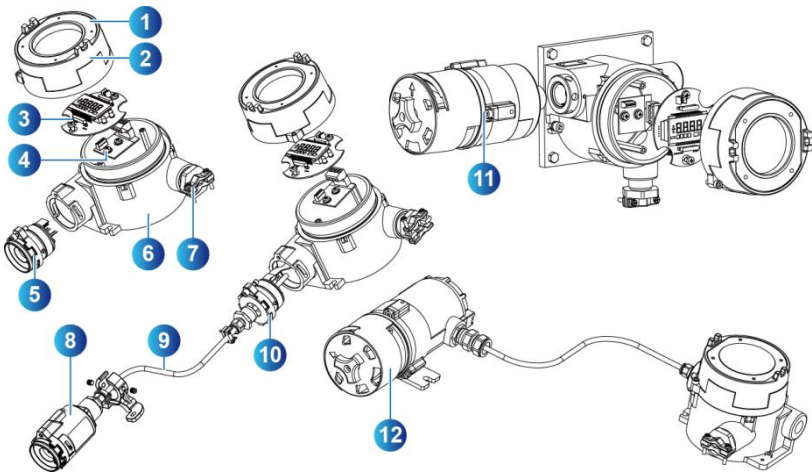


Figure 1: Main components of OLCT 60 detectors

External view

Overview

Id.	Description
1.	Digital display. See Figure 3 for more details.
2.	Ground terminal
3.	Cover fixation screw
4.	Cable gland (until August 2014)
5.	On-board sensor. See 7 for more details.
6.	Remote sensor. See 7 for more details.
7.	On-board OLCT IR infrared sensor head. See 7 for more details.
8.	Remote OLCT IR infrared transmitter. See 7 for more details.

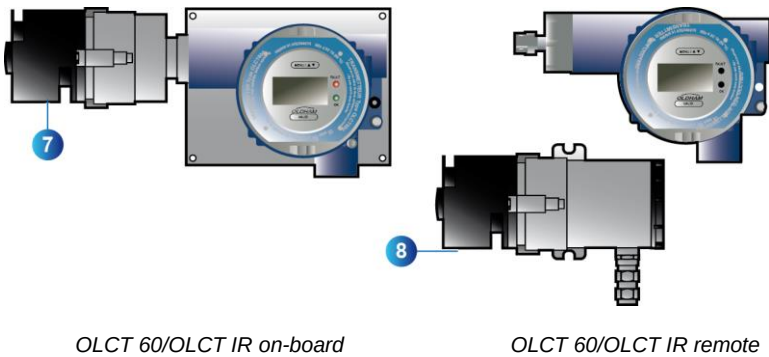
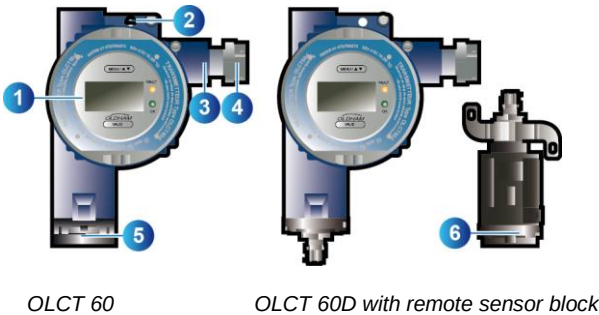


Figure 2: OLCT 60 overview

Difference between FLP and IS sensors

Although they have different ATEX marking, intrinsically safe and flameproof sensors are distinguished by the color of the sensor block as following:

- Flameproof sensor: unpainted stainless steel enclosure equipped with a flame arrestor,
- Intrinsically safe sensor: blue painted stainless steel enclosure equipped a PTFE membrane.

Display and LEDs

Id.		Description
1.	Digital display indicates: - Gas concentration and gas type alternately with gas unit. If an error occurs, the respective error code is displayed and Fault LED is lit on. Please revert to section <i>Readings on the display</i>, page 14. - Maintenance menus. Please revert to section <i>Menus</i>, page 14.	
2.	Magnetic switch	
3.	Fault LED (orange)	
4.	Power LED (green)	
5.	Magnetic switch	
6.	Magnetic wand	



Figure 3: General Status Screen

Internal view

Id. Description	
1.	Electronic circuit board
2.	Terminal block

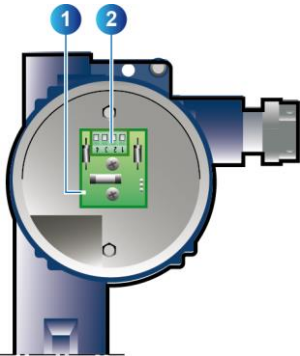


Figure 4: Detector internal view (with display board removed)

Labels and pictograms

The detector has two identification labels, as shown below:

Certification label

Id. Description	
1.	ATEX marking
2.	Type of product
3.	Manufacturer's name
4.	IECEX marking and ATEX certification temperature range (is <u>not</u> the operating temperature range)
5.	Warning
6.	CE and ATEX marking



Figure 5: Certification label

P/N label

This label is located on the side of the enclosure and contains the following information:

Id.	Description
1.	Part Number of the OLCT 60 without sensor
2.	Disposal icon
3.	Serial Number

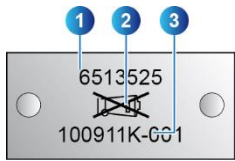


Figure 6: Side label

Visual indication

At startup

Display shows:

- Initialization screen. All LCD segments and LEDs turn on
- Firmware version
- Batch number
- Serial Number
- Gas concentration reading once initialization and stabilization are completed

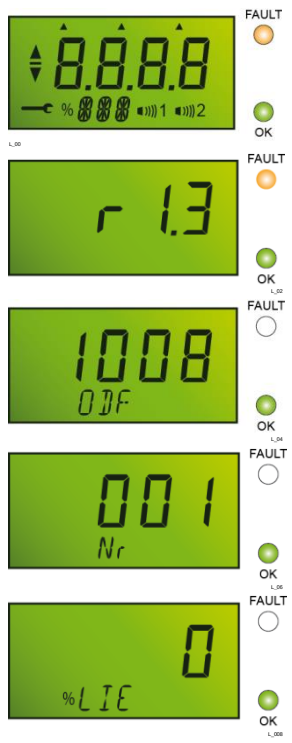


Figure 7: Warm-up screen

In normal operation

In normal operation, the display alternately shows the gas concentration, the type of gas and the gas unit. The *OK* green indicator is lit on; the *FAULT* indicator is turned off.

Indicator	Lit	Off
OK	OLCT 60 is powered	OLCT 60 is not powered
FAULT	Detector in fault or in maintenance mode See <i>Fault mode screen</i>	Normal Operation



Figure 8: OLCT 60 in normal operating mode

Fault mode screen

The display indicates DEF or the fault code (see page 71 for more warning code information). Simultaneously, the *FAULT* indicator lights on and the  icon is displayed.

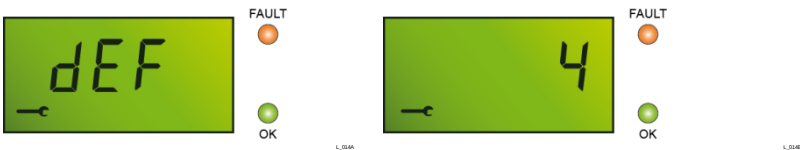


Figure 9: OLCT 60 in fault mode

Maintenance Menus

Access

You can access the menus without opening the enclosure thanks to a magnet (rep. 1) that must be placed over  (rep. 2).



Figure 10: place the magnet over ‘VALID’ to access the menus

Gas calibration menu

The menu is different depending on whether the OLCT 60 is equipped with an OLCT IR infrared sensor.

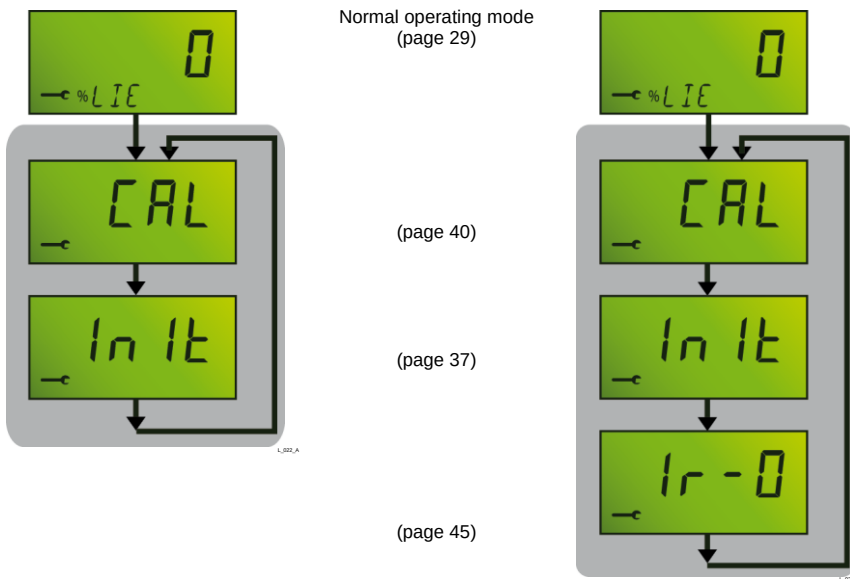


Figure 11: Gas calibration menu (on the right: OLCT 60 equipped with an OLCT IR infrared sensor)

- CAL: zero and span calibration. See page 40.
- Init: sensor replacement. See page 38.
- Ir-0: OLCT IR zeroing. See page 45.

Chapter 2 | Installation



Please read the guidelines on the installation, use and maintenance of detectors for detection of flammable gases and oxygen (standard EN/IEC 60079-29-2) and toxic gases (standard EN 45544-4).

Regulations and conditions of use

- The installation will be done according to current standards for installation in explosive areas especially regulations IEC/EN 60079-14 and IEC/EN 60079-17 (current editions) or according to other national standards.
- The equipment is authorized for use in Zones 1, 2, 21 and 22 and is certified for ambient temperatures from -20 °C to + 60 °C. **Note that this is not the operating temperature which, by the way, is sensor dependent.**
- Regarding the OLCT 60D-id version, the remote sensor can be used in zones 0, 1, 2, 20, 21 and 22. The transmitter itself is for use in zones 1, 2, 21 and 22 only.
- The detector must always be in contact with the ambient air. Thus:
 - Do not cover the sensor,
 - Do not paint the sensor,
 - Avoid dust deposits.

Necessary equipment

- Complete detector assembly
- Cable
- Tools
- Fixing hardware
- Multimeter (intrinsically safe certified when needed)

Location of the detector

Depending on the density of the gas to be detected or the application, the detector shall be positioned at ground level, or on the ceiling at the same height as the airflow, or near air extraction ducts. Heavy gases may be detected at the ground level, while light gases will be found at ceiling height. Gas densities are found on page 46.

Detector positioning

All versions excluding OLCT IR

The OLCT 60 will be installed with the sensor pointing downwards. For combustible gas detectors only, any tilt of more than 45° from the vertical will lead to an inaccurate measurement.

Fixing the enclosure will be performed by using 2 x M6 screws and the appropriate plugs for the supporting material. A special holder is available for mounting the detector on the ceiling (see chapter *Accessories*).

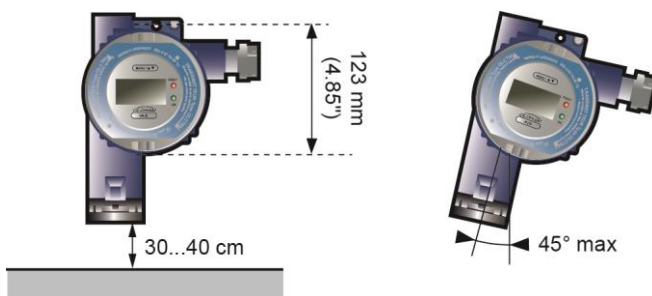


Figure 12: installation of an OLCT 60 with on-board sensor

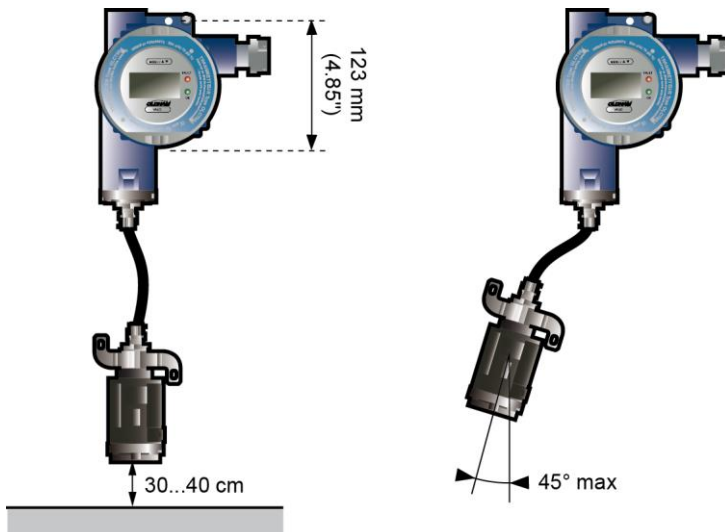


Figure 13: installation of an OLCT 60D with remote sensor

OLCT 60 with local or remote OLCT IR

The infrared sensor shall be installed horizontally with the arrow on the splashguard pointing upwards.

Fixing the detector will be performed by using 2 x M6 screws and the appropriate plugs for the supporting material.

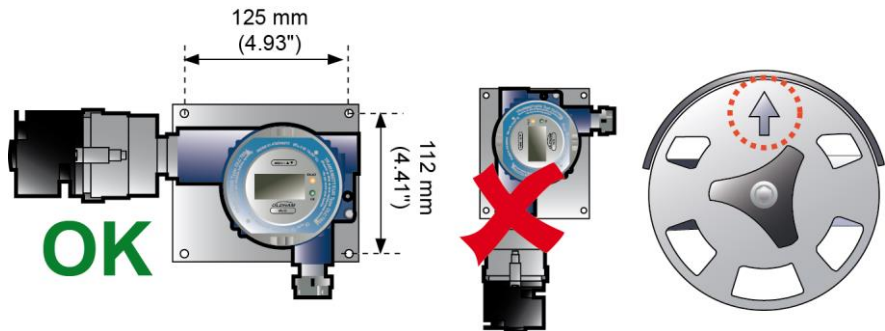


Figure 14: OLCT IR detector **MUST** be laid horizontally, arrow pointing upwards

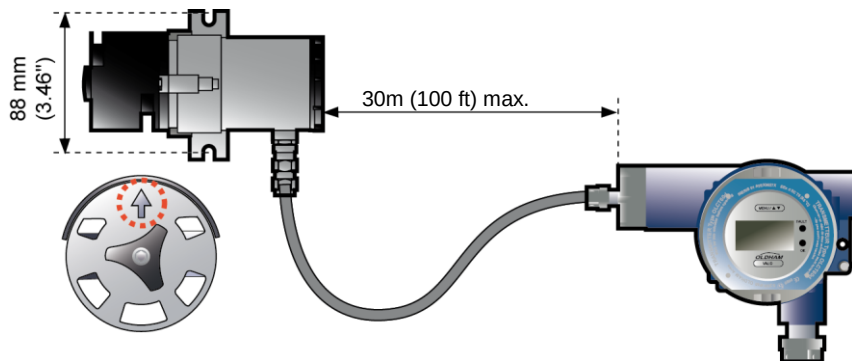


Figure 15: OLCT IR detector must be laid horizontally, arrow pointing upwards

Electrical Specifications

Type of sensor	Input Voltage (Vdc)	Maximum current (mA)	Power consumption (W)
Catalytic	16 to 32	140	2.24
Infrared (XPIR)	16 to 32	120	1.92
Infrared (OLCT IR)	16 to 32	550	8.80
Electrochemical	16 to 32	80	1.28
Semiconductor	16 to 32	140	2.24

Connecting cable

The detector shall be connected to the controller with a 3-wire shielded cable. Core size depends on the specific requirements of the installation, the distance and type of detector (see table below).

Type of detector	Type of sensor	Maximum length (km) depending on the core size			Maximum load resistance (Ω)
		0.5mm ² (AWG20)	0.9mm ² (AWG 18)	1.5mm ² (AWG15)	
Explosimeter	Catalytic	0.55	1.0	1.7	250
Explosimeter	Infrared (XPIR)	0.65	1.2	2.0	250
Explosimeter	Infrared (OLCT IR)	0.13	0.25	0.45	300
Toximeter	Electrochemical	1.0	1.8	3.0	250
Oxygen detector	Electrochemical	1.0	1.8	3.0	250
Freon	Semiconductor	0.55	1.0	1.7	250

Table 2: Maximum distance cable (with 24 Vcc at controller terminals)

The cable must be shielded to reduce the influence of electrical and radio-frequency interference. A cable such as AFNOR M 87-202-01-IT-15-EG-FA (Nexans) may be used. It shall be selected according to the type of detector and in accordance with the table shown hereinabove. Here are some more examples of suitable cables:

Safe area: CNOMO FRN05 VC4V5-F
ATEX zone: GEVELYON (U 1000RHC1)
ATEX zone: GVCSTV RH (U 1000)
ATEX zone: xx-xx-09/15- EG-SF or EG-FA or EG-PF (U 300 compatible with M87202).

The maximum permissible length will depend on the cross-section of the cable conductors (see table) and on the minimum admissible supply voltage at the detector terminals.

Cable connection

Turn off the line

On the controller:

1. Inhibit any alarms to prevent false alarms during operation.
2. Switch off the power supply to the detector.

Opening of the detector

Loosen the 4mm hex screw (rep.1) locking the cover before removing the detector cover.



Figure 16: Locking screw of the cover

Cable preparation

The cable will be supplied from the controller at the measurement point. The passage, support, and protection of the cable shall be done according to best practice.

Cable entry



It is essential to follow the instructions given by the manufacturer of the cable gland and to connect the shielding properly. Cable-gland or adaptor shall be M25 x 1.5 and flameproof certified.

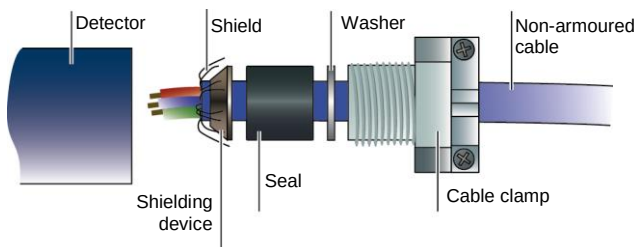


Figure 17: non-armoured cable gland type

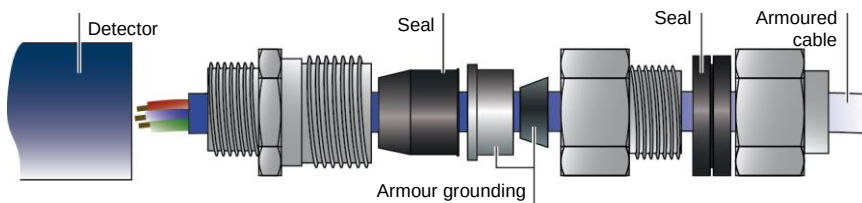


Figure 18: armoured cable gland type

Cable connection (OLCT 60)



Remove power before wiring the OLCT 60 to the controller. The site must be equipotential.

Connect the cable to the detector first and then connect the controller. Once the wiring is completed, connect the shield of the cable to the ground terminal of the controller.

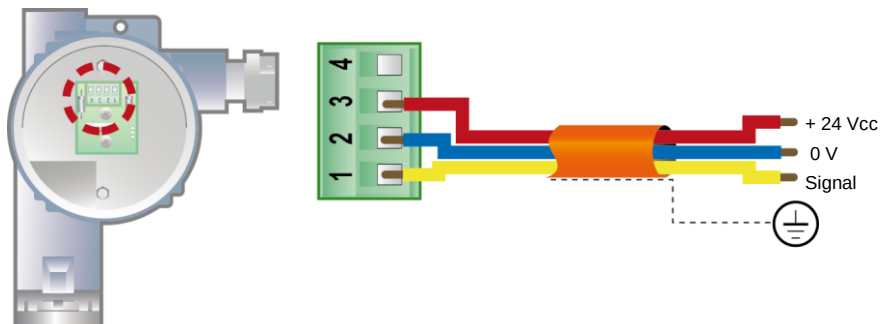


Figure 19: wiring the OLCT 60 (d or id version)

Cable connection (OLCT 60/OLCT IR remote)



Remove power before wiring the OLCT 60 to the controller. The site must be equipotential.

First carry out the connection between the OLCT IR (rep. A) and the detector (rep. B) as shown in Figure 20. The maximum distance is 30 meters (100 feet). The type of cable to use is 01-IQ-09-EG-FA or EG-SF or similar; see page 20.

Then connect the OLCT 60 as described previously.

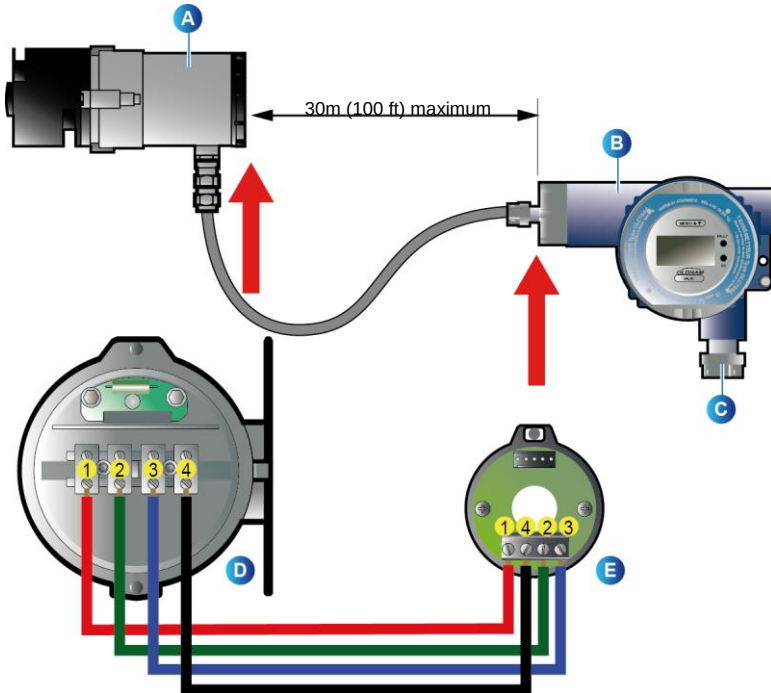


Figure 20: wiring the OLCT 60D/OLCT IR. Ensure the specificity of the numbering of the connector marked «D» compared to the connector marked «E».

Detector grounding

Connect the enclosure ground points to earth according to the regulations with a 4mm² (11 AWG) wire.

The OLCT 60 features an internal ground point as well. The internal grounding shall be preferred as the primary equipment ground.

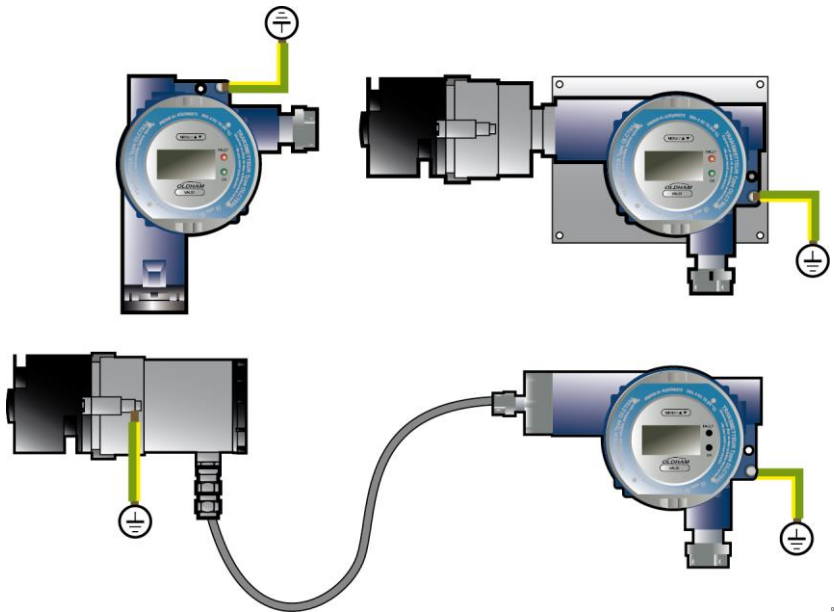


Figure 21: OLCT 60 grounding

Closing the cover

Before connecting the OLCT 60 to the controller, the cover shall be tightly closed. Firmly tighten the locking screw as well (see Figure 16, page 21).

Scope of use

Gas sensors have limitations that must be observed (see Chapter 10 | Special instructions for use in explosive environments and functional safety).

Presence of specific components

- Vapors from components containing silicone or sulfur can affect the catalytic sensors and thereby distort measurements. If sensors have been exposed to these types of compounds, a bump test shall be performed.
- High concentrations of organic solvents (e.g. alcohols, aromatic solvents, etc.) or exposure to quantities of gas greater than the specified range of measurement can damage the electrochemical sensors. Inspection or calibration is then recommended.
- In the presence of high concentrations of carbon dioxide ($\text{CO}_2 > 1\% \text{ vol.}$), the oxygen-measuring electrochemical sensors can slightly overestimate the concentration of oxygen (0.1 to 0.5% volume O_2 overestimate).

Operation under low oxygen levels

- If an electrochemical sensor is used in an atmosphere comprising less than 1% oxygen for over one hour, the measurement may be an underestimate.
- If a catalytic sensor is used in an atmosphere comprising less than 10% oxygen, the measurement may be an underestimate.
- If a semiconductor detector sensor is used in an atmosphere comprising less than 18% oxygen, the measurement may be an underestimate.

Transfer curve

The curve shown gives the transmitter output current as a function of the gas concentration. If you connect the transmitter to a different unit than the one provided by Oldham, you should be certain that the transfer curve is fully compatible with the input characteristics of your device to ensure proper interpretation of the information provided by the transmitter. Similarly, the unit should provide sufficient voltage to compensate for any voltage drop in the cable.

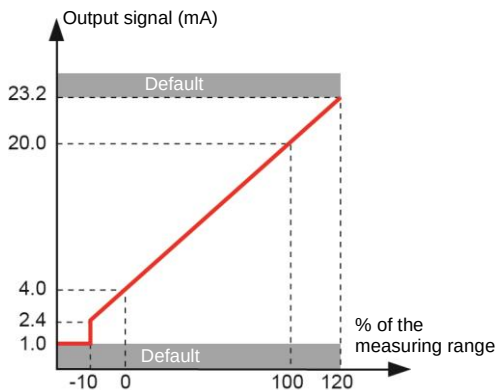


Figure 22: OLCT 60 transfer curve

Chapter 3 | Commissioning and operating modes



The tasks described in this chapter should only be performed by authorized and trained personnel as they are likely to jeopardize the reliability of detection.

This chapter describes:

- how to check the zero
- how to check the sensitivity
- the various operating modes

Purpose of control

Upon delivery, each detector has been tested and calibrated. There is normally no need for a new calibration.

However, for safety, it is advisable to check the zero and the sensitivity as shown below.



The detector cover shall remain completely closed since the adjustments are carried out through the window.

For flammable gas detector, we always recommend to calibrate the sensor with the targeted gas. When the user wishes to calibrate the detector with a different gas, refer to the table on page 46 for the use of recommended gas and corresponding coefficient.

Necessary equipment

- Zero grade air cylinder
- Appropriate span gas cylinder (gas concentration should be between 30 and 70% of the measurement range)
- Calibration cup (see Chapter *Accessories*)

Commissioning

Prior checks

Check the following points:

- Wiring completed
- Detector grounded
- Shielding grounded at controller side
- Integrity of the mechanical mounting (fixings, cable gland, and cover) ensured

Powering up detector

1. Inhibit any alarms to avoid false alarms during operation
2. Apply power to the OLCT 60

Stabilization time

Before initial calibration allow the detector to stabilize after applying power. Any adjustment before the time indicated will result in an incorrect measurement, which may in turn compromise the safety. The total waiting time is summarized below:

- Catalytic bead sensor: 2 hours
- Oxygen sensor: 1 hour
- Electrochemical sensor: 1 hour, excluding:
 - NO (Nitrogen Monoxide): 12 hours
 - HCl (Hydrogen Chloride): 24 hours
 - ETO (Ethylene Oxide): 36 hours
- Semiconductor sensor: 4 hours
- Infrared sensors (XPIR and OLCT IR): 2 hours

Display of the gas measurement

Normal operating mode

Alternately, the display shows the measured concentration and the type of gas.

The *OK* green indicator is lit; the *FAULT* indicator is off.



Figure 23: Normal operating mode

Fault mode

In fault condition, the display indicates «dEF» followed by the fault code.

In the event of an internal electronic error, the display indicates «E» followed by the error code.

In both cases, the *FAULT* indicator is lit. Proceed with the corrective action in compliance with page 35. See page 71 for more warning code information.



Figure 24: Fault mode

Over-Range condition

(catalytic version only)

For safety reasons, when measuring a concentration of a flammable gas above 100% LEL, the display indicates «SUP» and the *FAULT* indicator is lit. Meanwhile the analog output signal is set at 23.2 mA.

To exit this mode, swipe the magnet over  once you have checked the absence of any explosive atmosphere with a portable combustible gas monitor for example.



Figure 25: Over-Range indication

Checking Zero

Proceed as follows:

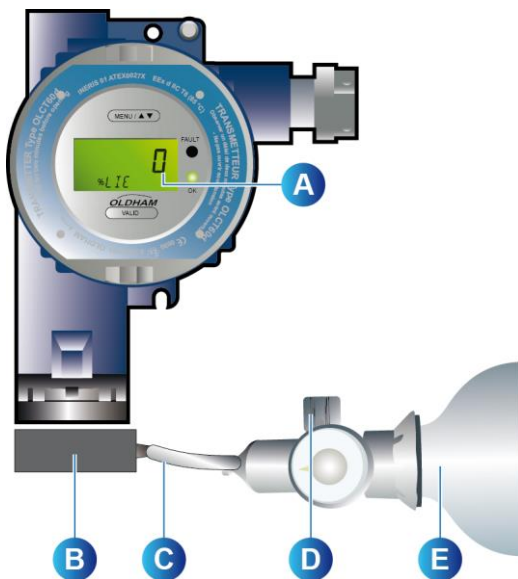


Figure 26: Checking Zero

1. Inhibit any alarms on the controller.
2. Place the calibration cup over the sensor (Figure 26, rep. B).
3. Connect the calibration cup to the zero gas cylinder (rep. E) by using a tubing in PTFE (Pos. C).
4. Apply the gas (flow regulator set to 0.5-1.0 liter per minute (LPM) or 1.0-2.0 LPM for OLCT IR versions) (rep. D).
5. Once the measure is stabilized (approx. 2 minutes), read the value on the display (rep. A).
6. If the expected value does not comply, proceed with the calibration (paragraph *Zeroing and sensitivity adjustment*, on page 40).
7. Continue with *Checking gas sensitivity* on the next page.

Checking gas sensitivity

For safety reasons, this procedure must be carried out after the control of the zero (page 29). Proceed as follows:

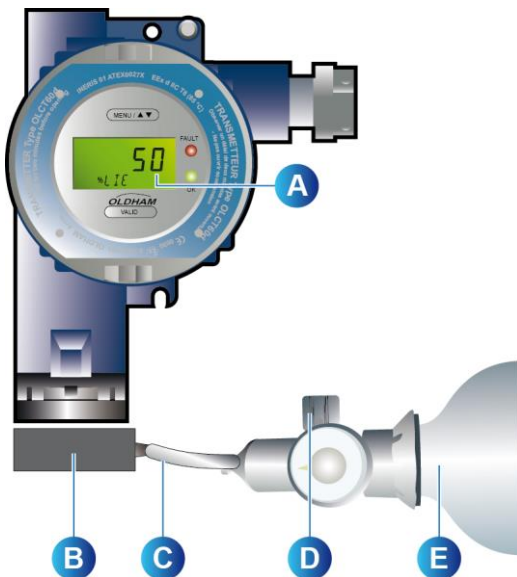


Figure 27: Checking gas sensitivity

1. Once the detector is zeroed, connect the calibration cup to the calibration gas cylinder (Pos. E) by using a tubing in PTFE (Pos. C) to prevent the adsorption of reactive gases (i.e.: HCl, SO₂, Cl₂, etc.) at the surface of the tube.
2. Open the valve on the gas cylinder (flow rate 0.5 to 1 LPM or 1 to 2 LPM in the case of OLCT IR versions) (rep. D).
3. Once the measurement is stabilized (approx. 2 minutes), read the value on the display (rep. A).
4. If the expected value does not comply, proceed with the calibration (paragraph *Zeroing and sensitivity adjustment*, on page 40).
5. Close the valve (rep. D) of the gas cylinder and remove the calibration cup (rep. B). Wait for the measurement to return to zero and reset the alarms on the controller. The control of zero and gas sensitivity is now completed.

Chapter 4 | Preventive maintenance

Periodic checks enable the equipment and installation to remain in conformity and ensure reliable detection. This chapter describes what preventative action should be taken and at what intervals. Inspection and maintenance are carried out in accordance with EN/IEC 60079-17 standard in force or with other national standards.

Maintenance schedule

Gas detectors are safety devices. OLDHAM recommends the regular testing of fixed gas detection installations. This type of test consists of injecting the calibration gas into the detector at a sufficient concentration to activate the pre-set alarms. It is to be understood that this test is in no way a replacement for a detector calibration.

The frequency of gas tests depends on the industrial application where the detector is in use. Frequent inspections should be made in the months following the commissioning of the installation, and should then become more widely spaced provided that no significant deviation is observed. If a detector should fail to react in contact with the gas, calibration is essential. The frequency of calibrations shall be appropriate according to the results of the tests (humidity, temperature, dust, etc.); however, it must not exceed one year.

The general manager should put safety procedures in place on-site. OLDHAM cannot be held responsible for their enforcement.



When used in a SIL 1 system, according to European standard EN 50402, Requirements relating to the safety operation of fixed gas detection systems, the maintenance interval for combustible gas detectors shall not exceed 6 months.

For SIL 2 systems, the maintenance interval shall not exceed 3 months.

Actions

OLCT 60

Periodic maintenance comprises the following actions:

- Removal of dust from the sensor and its optional protective cover with a dry cloth only. No water or solvents should be used. Severely dusty sensors should be replaced immediately.
- For use in dusty explosive atmospheres, the user should undertake full and regular cleaning to avoid the build-up of dust. The maximum permissible thickness of a dust layer must be less than 5 mm.
- Replacement of screws: if any screws on the flameproof part need to be replaced, screws of equal quality or better than A4.70 should be used.
- Zero inspection with zero grade air; see page 29. In case of variance, comply with the actions described in this paragraph.
- Gas sensitivity check; see page 30. In case of variance, comply with the actions described in this paragraph.

OLCT 60/ OLCT IR

Refer to the specific OLCT IR manual.

Chapter 5 | Maintenance

Maintenance primarily comprises changing any sensors that no longer meet their initial metrological characteristics.



Since they are liable to affect detection reliability, the tasks described in this chapter are reserved for authorized trained personnel only. Inspection and maintenance shall be carried out in accordance with EN/IEC 60079-17 standards in force or with other national standards.

Possible errors

The table below summarizes the various possible detector errors.

Observed default	Possible cause	Action	(page)
current output is at 0 mA	Connector cable	Check cable	50
	Power supply	Check voltage at detector terminal	-
	Electronic card	Change board	-
0 mA < current output < 1mA	Sensor	Change sensor	36
	Line resistance too high	Check cable	-
	Power supply	Check voltage at detector terminal	-
	Improper calibration gas	Check the content of the calibration gas	-
Zero setting not possible	Sensor	Change sensor	36
	Electronic card	Change board	
Sensitivity adjustment not possible	Sensor	Change sensor	36
	Electronic card	Change board	
«SUP» display	Over-Range condition	Valid with the magnet	29
		Check the span	42

Replacing sensor block (Explo, O₂, Tox, XPIR)



This paragraph is not applied to OLCT IR. Refer to the two paragraphs *Replacing the OLCT IR* on the next page.

The sensor block or detection module encloses the sensitive element and the corresponding electronics. A sensor block can only be associated with a defined detector; so an oxygen detection module will not be installed in the place of a LEL detection module.

Frequency of replacement

The sensor block needs to be replaced every time when zeroing, performing gas calibration or preventive maintenance are no longer possible.

Exchanging of the sensor

Step	Action
1.	Prepare the following elements: ▪ New sensor block ▪ 4 mm Allen wrench ▪ Calibration set (gas cylinder, calibration cup, etc.).
2.	Inhibit the alarms on the controller.
3.	Turn the OLCT 60 off.
4.	Loosen the locking screw in the sensor head and rotate the sensor head 30 degrees counterclockwise.
5.	Unplug the connector and remove the defective sensor head.
6.	Replace the worn out detector head with an identical new one.
7.	Reassemble in reverse order and tighten the locking screw.
8.	Power the OLCT 60.
9.	Install the OLCT 60 as explained in detail in the <i>Initialization of the sensor block</i> paragraph on page 37.

Replacing the OLCT IR – integrated version

Contact the manufacturer or distributor.

Replacing the OLCT IR – remote version

Exchanging the detector

Step	Action
1.	Prepare the following elements: ▪ New OLCT IR detector ▪ 4 mm Allen wrench ▪ Calibration set (gas cylinder, calibration cup, etc.).
2.	Inhibit the alarms on the controller.
3.	Turn the OLCT 60 off.
4.	Open the defective OLCT IR and disconnect it.
5.	Dismount the defective OLCT IR and put the new one in.
6.	Carry out the connections. Refer to the <i>Connection of the cable (OLCT 60/OLCT IR remote version)</i> paragraph on page 22.
7.	Reassemble in reverse.
8.	Power the OLCT 60.
9.	Install the OLCT 60 as explained in detail in the <i>Initialization of the sensor block</i> paragraph on page 37.

Initialization of the sensor block

Selection of the initializing menu (*Init*)

Step	Action	Illustration
1a.	After the startup phase, the screen will show the gas measurement (it may be wrong at this point). Place the magnet over  for 3 seconds.	
1b.	Until the  icon is displayed...	
	...present the magnet 3 consecutive times on the  in the 3 seconds.	
1c.	The calibration menu (CAL) is displayed.	
1d.	Place the magnet over  .	
1e.	The initialization menu (<i>Init</i>) is displayed.	

Initialization of the sensor block

This procedure resets the electrical parameters of the sensor.

Step	Action	Illustration
2a.	The <i>Init</i> screen is displayed, place the magnet over  .	
2b.	The display indicates «CnF» (<i>Confirmation</i>).	
2c.	Place the magnet over  .	

2d.	The display indicates «nOn» (No).	
2e.	Place the magnet over  to change No to Yes.	
2f.	Place the magnet over  to validate the choice. The procedure is then ended and the detector automatically resets.	
2g.	Wait 4 seconds during the display of the startup page.	
2h.	The version number of the software is displayed.	
2i.	The manufacturing date code is displayed.	
2j.	The serial number is displayed.	
2k.	Countdown starts before return in normal mode.	
2l.	When the countdown is ended, the display shows the gas measurement. The OLCT 60 is in normal mode.	
2m.	Subsequently check the gas operation as explained on pages 29 and 30.	

Zeroing and sensitivity adjustment (calibration)



This paragraph will be followed to the extent that the zero control (page 29) and/or the sensitivity (page 30) show a variance from the expected values. For safety reasons, it is important to proceed with the full calibration (zero and span settings).

In the event of a voluntary or an automatic abandon of the procedure, the previous values will be maintained.

OLCT 60 leaves the maintenance mode and returns to normal operation after 10 minutes of inactivity on the VALID or MENU / ▲▼.



The detector cover shall remain completely closed since the adjustments are carried out through the window.

For flammable gas detector, we always recommend to calibrate the sensor with the targeted gas. When the user wishes to calibrate the detector with a different gas, refer to the table on page 46 for the use of recommended gas and corresponding coefficient.

FOR OLCT IR infrared versions

It is imperative to zero the optics before proceeding as indicated in the *Optical zeroing* on page 45

Passage in calibration mode

Step	Action	Illustration
1a.	Place the magnet over VALID for 3 seconds.	
1b.	Until the  icon is displayed...	
	...present the magnet 3 consecutive times on the MENU / ▲▼ in the 3 seconds.	
1c.	The calibration menu (CAL) is displayed.	

Zeroing

Step	Action	Illustration
2a.	The calibration menu (CAL) is displayed.	
	Position the magnet over VALID .	
2b.	The display now shows "-0-" indicating the beginning of the zero-setting phase.	
2c.	Position the magnet over VALID .	
2d.	The display indicates the current value.	
2e.	Place the calibration cup and inject zero grade air at 0.5 to 1 LPM (1 to 2 LPM for OLCT IR versions). Wait approximately 2 minutes for the stabilization of the measure.	
	 The zero of a CO2 sensor block must be tested with a zero grade air cylinder or with nitrogen. Never consider ambient air as a zero value.	
2f.	The display eventually indicates a value that is different than zero. Place the magnet over VALID to confirm the zero adjustment.	
2g.	«GE» (Span Gas) is displayed to indicate that the system has switched over to the sensitivity adjustment phase.	

Adjustment of gas sensitivity

Accessing the sensitivity adjustment menu

Step	Action	Illustration
3a	«GE» (<i>Span Gas</i>) is displayed to indicate that the system has switched over to the sensitivity adjustment phase.	

Setting the Span Gas concentration

Step	Action	Illustration
4a	Place the magnet over  .	
4b.	The displayed value corresponds to the span gas value by default (50 in the example). The hundreds digit flashes.	
4c.	Adjusting the hundreds Adjust the value of the hundreds by placing the magnet over  . Each time you place the magnet over, you increase the digit value.	
4d.	Confirm the value by placing the magnet over  .	
4e.	Adjusting the tens The tens digit flashes. Repeat the same procedure as for the hundreds.	
4f.	Adjusting the units The unit digit flashes. Repeat the same procedure as for the hundreds.	
4g	Validate the digit of the units by placing the magnet over  .	
4h.	End of the procedure.	

Injecting calibration gas

Step	Action	Illustration
5a.	The display indicates «S» (Sensitivity).	 L_005
5b.	Place the calibration cup on the sensor and inject the span gas at flow rate between 0.5 and 1 LPM (1 to 2 LPM for OLCT IR versions).	
5c.	Position the magnet over VALID .	
5d.	The displayed value keeps changing until it stabilizes. Wait approximately 2 minutes for the stabilization of the measure.	 L_005
5e.	As soon as the instrument stabilizes at a value, place the magnet over VALID to exit the sensitivity adjustment function. Continue to step 6a.	 L_002

Validating your calibration

Step	Action	Illustration
6a.	The display indicates «CnF» (Confirmation).	 L_004
6b.	Position the magnet on VALID .	
6c.	The display indicates «nOn» (No).	 L_005
6d.	To validate and confirm your calibration values, set the magnet on MENU / ▲▼ to change No into Yes and then on VALID to confirm. Continue as under paragraph <i>End of zero-point adjustment and calibration</i> .	 L_006
6e.	Otherwise place the magnet on VALID . When you do so, the detector will return to normal mode after a one-minute countdown and without applying any of the previous adjustments.	 L_006

End of the zero-setting and calibration procedure

Step	Action	Illustration
7a	The OLCT 60 starts a countdown before returning in normal operation mode. Please note: The countdown time is sensor dependent.	 L_02
7b.	Close the cock of the calibration gas cylinder and remove the calibration cup.	
7c.	As soon as the countdown is over, the ambient gas concentration must be shown on the display. The detector is now in normal operation mode. Restore the alarms on the controller.	 L_03
7d.	If the display shows «dEF» (Fault) followed by the fault number, it means that the detector is not operational. Check the fault code number (page 71) and implement the recommended remedies. See page 35.	 L_04

Adjusting the optical zero (Ir-0)

(for OLCT IR versions)



This menu strictly applies for OLCT IR versions prior to set the zero or the sensitivity or after cleaning optical parts (see page 40).
Cleaning the optical parts is described in the manual of the OLCT IR.

Selecting the menu

Step	Action	Illustration
1a.	Place the magnet over  for 3 seconds.	
1b.	Until the  icon is displayed...	
	...present the magnet 3 consecutive times on the  in the 3 seconds.	
1c.	The calibration menu (CAL) is displayed.	
1d.	Place the magnet twice on  .	
1e.	The optical zero setting menu (Ir-0) is displayed.	
1f.	Inject zero grade air at 1 to 2 LPM for 2 minutes and then place the magnet over  .	
1g.	The display indicates «CnF» (Confirmation).	
1h.	Place the magnet over  .	

-
- 1i. The display indicates «nOn» (No).



L_08

-
- 1j. Place the magnet over to change No to Yes and adjust the optical zero.
Place the magnet over to validate the choice.



L_08

-
- 1k. Place the magnet over to confirm No and exit the optical zero setting menu.



L_08

Applicable coefficients for explosive gas calibration

Catalytic sensor type VQ1

The applicable coefficients are shown in the following table.

Gas	Chemical Formula	LEL (%)	LSE (%)	Flash point (°C)	Vapor density	Coefficient Calibration gas CH4(methane)	Coefficient Calibration gas H2(hydrogen)	Coefficient - Calibration gas C4H10 (Butane)	Coefficient - Calibration gas C5H12 (Pentane)
Ethyl acetate	C4H8O2	2,10	11,50	-4	3,0	1,65	1,35	0,90	0,80
Acetone	C3H6O	2,15	13,00	-18	2,1	1,65	1,35	0,90	0,80
Acetylene	C2H2	1,50	100	-18	0,9	2,35	1,90	1,25	1,15
Acrylic acid	C3H4O2	2,40	8,00	54	2,5	5,00	4,00	2,65	2,40
Butyl acrylate	C7H12O2	1,20	8,00	37	4,4	3,50	2,80	1,85	1,70
Ethyl acrylate	C5H8O2	1,70	13,00	-2	3,5	3,05	2,45	1,65	1,50
Acrylonitrile	C3H3N	2,80	28,00	-1	1,8	1,45	1,20	0,80	0,70
Ammoniac	NH3	15,00	30,20	< -100	0,6	0,90	0,75	0,50	0,45
Benzene	C6H6	1,20	8,00	-11	2,7	4,00	3,20	2,15	1,90
1.3-Butadiene	C4H6	1,40	16,30	-85	1,9	2,55	2,05	1,35	1,25
Butane	C4H10	1,50	8,50	-60	2,0	1,90	1,55	1,00	0,90
Butanol (Butyl Alcool)	C4H10O	1,4	11,3	29	2,6	1,95	1,60	1,05	0,95
2 - Butanone (MEK)	C4H8O	1,80	11,50	-4	2,5	3,90	3,15	2,10	1,90
Cyclohexane	C6H12	1,20	8,30	-17	2,9	2,00	1,60	1,10	1,00
Dimethylether	C2H6O	3,00	27,00	-41	1,6	1,80	1,45	0,95	0,90
Dodecane	C12H26	0,60	~6,0	74	5,9	4,00	3,20	2,15	1,90
Ethane	C2H6	3,00	15,50	135	1,0	1,50	1,20	0,80	0,75
Ethanol	C2H6O	3,30	19,00	13	1,6	2,15	1,75	1,15	1,05
Ether (Diethylether)	(C2H5)2O	1,70	36,00	-45	2,6	1,90	1,55	1,00	0,90
Ethylene	C2H4	2,70	34,00	-135	1,0	1,65	1,35	0,90	0,80
LPG	Prop+But	1,65	~9,0	< -50	1,9	1,90	1,55	1,00	0,90
Diesel	Melange	0,60	~6,0	55	> 4	3,20	2,60	1,70	1,55
Natural Gas	CH4	5,00	15,00	-188	0,6	1,05			
Heptane	C7H16	1,10	6,70	-4	3,5	2,20	1,80	1,20	1,05
Hexane	C6H14	1,20	7,40	-23	3,0	2,10	1,70	1,15	1,00
Hydrogen	H2	4,00	75,60	-	0,069		1,00		
Isobutane	C4H10	1,50	8,40	-83	2,0	1,50	1,20	0,80	0,75
Isobutene	C4H8	1,60	10,00	<-10	1,9	2,20	1,80	1,20	1,05

Gas	Chemical Formula	LEL (%)	LSE (%)	Flash point (°C)	Vapor density	Coefficient Calibration gas CH4(methane)	Coefficient Calibration gas H2(hydrogen)	Coefficient Calibration gas C4-H10 (Butane)	Coefficient Calibration gas C5-H12 (Pentane)
Isopropanol	C3H8O	2,15	13,50	11,7	2,1	1,60	1,30	0,85	0,80
Kerosene (JP4)	C10 - C16	0,70	5,00	> 50	> 4	5,00	4,00	2,65	2,40
Methyl Methacrylate	C5H8O2	2,10	12,50	2	3,5	2,25	1,80	1,20	1,10
Methane	CH4	5,00	15,00	-188	0,55	1,00			
Methanol	CH3OH	5,50	44,00	11	1,1	1,40	1,15	0,75	0,70
Naphta	melange (Mixture)	0,90	5,90	> 44	> 4	3,50	2,80	1,85	1,70
Nonane	C9H20	0,70	5,60	31	4,4	4,40	3,55	2,35	2,10
Octane	C8H18	1,00	6,00	12	3,9	2,70	2,20	1,45	1,30
Ethylene Oxide	C2H4O	2,60	100	-20	1,5	2,10	1,70	1,15	1,00
Propylene oxide	C3H6O	1,90	37,00	70	2,0	2,35	1,90	1,25	1,15
Pentane	C5H12	1,40	8,00	-49	2,5				1,00
Propane	C3H8	2,00	9,5	-104	1,6	1,55	1,25	0,85	0,75
Propylene	C3H6	2,00	11,70	-107,8	1,5	1,65	1,35	0,90	0,80
Styrene	C8H8	1,1	8,00	31	3,6	6,30	5,05	3,35	3,00
Gasoline lead free	/	1,10	~6,0	21	3 à 4	1,80	1,45	0,95	0,90
Toluene	C7H8	1,20	7	5	3,1	4,00	3,20	2,15	1,90
Turpentine Oil	-	0,8	6,0	35	4,7	3,50	2,80	1,85	1,70
Triethyl amine	C6H15N	1,20	8	-15	3,5	2,05	1,65	1,10	1,00
White Spirit	melange (Mixture)	1,10	6,50	>30	> 4	3,50	2,80	1,85	1,70
Xylene	C8H10	1,00	7,60	25	3,7	4,00	3,20	2,15	1,90

 : recommended gas for detector calibration

Table 3: Coefficients for the calibration of catalytic detectors equipped with a standard sensor VQ1

4F poison resistant catalytic bead sensor

The applicable coefficients are:

Gas	Chemical Formula	LEL %	LSE %	Vapor density	CH ₄ Coef	C ₅ H ₁₂ Coef	H ₂ Coef
Acetone	C ₃ H ₆ O	2,15	13,0	2,1	1,8	0,9	
Acetylene	C ₂ H ₂	1,5	100	0,9	1,4		
Ammoniac	NH ₃	15,0	30,2	0,6	1,0	0,5	
Benzene	C ₆ H ₆	1,2	8,0	2,7	2,10	1,05	
n-Butane	C ₄ H ₁₀	1,5	8,5	2,0	1,8	0,9	
Ethane	C ₂ H ₆	3,0	15,5	1,0	1,4	0,7	
Ethanol	C ₂ H ₆ O	3,3	19,0	1,6	1,6	0,8	
Ethylene	C ₂ H ₄	2,7	34,0	1,0	1,4	0,7	
n-Hexane	C ₆ H ₁₄	1,2	7,4	3,0	2,85	1,4	
Hydrogen	H ₂	4,0	75,6	0,07			1,0
Isopropanol	C ₃ H ₈ O	2,15	13,5	2,1	1,8	0,9	
JP-4					3,0	1,5	
JP-5					3,1	1,55	
JP-8					3,2	1,6	
Methane	CH ₄	5,0	15,0	0,55	1,0		
Methanol	CH ₃ OH	5,5	44,0	1,1	1,35	0,65	
n-Pentane	C ₅ H ₁₂	1,4	8,0	2,5	2,0	1,0	
Propane	C ₃ H ₈	2,0	9,5	1,6	1,6	0,8	
Styrene	C ₈ H ₈	1,1	8,0	3,6	2,4	1,2	
Toluene	C ₇ H ₈	1,2	7,0	3,1	2,5	1,25	
Xylene	C ₈ H ₁₀	1,0	7,6	3,7	2,4	1,2	

: recommended gas for detector calibration

Table 4: Coefficients for the calibration of detectors equipped with a 4F poison resistant catalytic bead

Example: (Catalytic sensor type VQ1, Table 3)

Calibration of an «acetone» detector with span gas at 1% butane concentration.

Value to be entered for the span gas concentration («GE», step 4b, page 42):

1% (injected butane) x 100 x 0.90 (butane/acetone coefficient) = 60 % LEL

1.5 % (LEL butane)

Please note:

- LEL values vary according to the source
- Coefficients are accurate to ± 15 %.
- For other gases/vapors consult our technical service.

Checking the line current

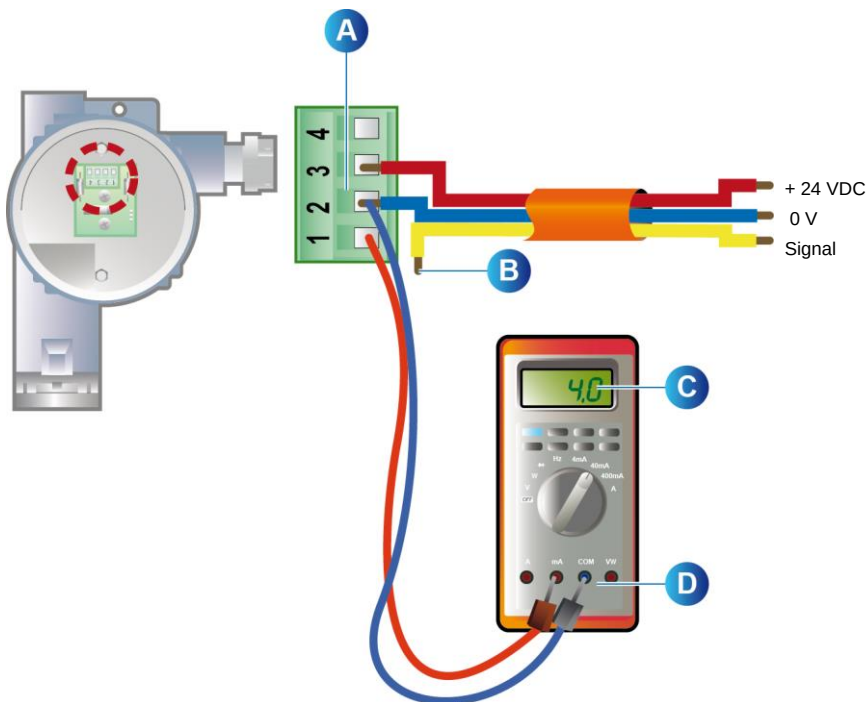


Figure 28: Checking the current generator of the detector

Proceed as follows:

1. Check the detector for proper power supply (+24V between terminal 2 and 3).
2. Switch the multimeter over to current measurement (mA range).
3. Make sure to inhibit the controller to avoid any false alarm. Disconnect the signal wire (terminal 1, Pos. B). Connect the «COM» terminal of the multimeter (Pos. D) to terminal 2 (0 V) of the detector (Pos. A).
4. Connect the «mA» terminal of the multimeter (Pos. D) to terminal 1 (signal) of the detector (Pos. A).
5. The current must be 4 mA (Pos. C) when zero grade air is applied on the sensor and 20 mA when applying span gas of concentration equal to the full scale.
6. Once testing is completed, connect back the signal wire to terminal 1 (Pos. B).

Chapter 6 | Accessories

The following accessories do not apply for OLCT 60/OLCT IR. For the latter please revert to the OLCT IR manual.

Accessories	Utilization	Illustration	Illustration
Tool Kit	Opening of the OLCT 60 and sensor replacement		6147870
OLCT 60/OLCT IR calibration set	Please read OLCT IR manual. The calibration cup is different and the flow rate must be between 1 and 2 LPM.		6313863
Calibration cup	Shall be used for sensor calibration.		6331141
By-pass adaptor	Allows <i>bypass</i> measuring. Effects on measurement: no effect if calibration is done in the same conditions (pipe, flow). Effects on response time: none.		6327910
Splash-guard	Protects the sensor against splashing liquids. Effects on measurement: none. Effects on response time: the response time at natural diffusion may increase for certain gases. Please consult us.		6792844
Remote calibration cup	Allows gas detection and the use of a tubing for calibration gas injection. For combustible gases only. Flow rate 1 LPM minimum. Effects on the measurement: none. Effects on response time: negligible.		6327911

Accessories	Utilization	Illustration	Illustration
PTFE protection filter	Protects the sensor against splashing liquids and dust contamination. Effects on the measurement: no effect, but cannot be used to detect O₃, HCL, HF, CL₂. Effects on response time: increased response time (please consult us for high-density gas > 3 and low concentrations < 10 ppm).		6335975
Ceiling gas collector	Allows the sensor to detect gas more quickly. Effects on the measurement: none. Effects on response time: may increase by 10%		6323620
Magnet	Used for menu selection through the detector glass window.		6155651
Cable entry adaptor	M25 / M20 adaptor M25 / 3/4 NPT adaptor		6143552 6143584

Chapter 7 | Spare parts

Spare parts list for different detectors



Spare parts must be original OLDHAM parts. Use of non-original spare parts may impair safety of the instrument.

Explosionproof sensor block

Illustration	Description
6 313 685	OLCT 60 0-100% LEL with VQ1 catalytic bead
6 313 872	OLCT 60 0-100% LEL Butadiene/Acetylene (VQ1 catalytic bead)
6 313 974	OLCT 60 0-100% LEL with 4F poison resistant sensor
6 313 687	OLCT 60 0-100% vol. CH4 sensor block
6 313 986	Sensor block OLCT 60, 0-100% vol. H2 or SF6
6 314 060	Infrared sensor block 0-100% LEL CH4 (5% vol.) for OLCT 60 XP IR
6 314 093	Infrared sensor block 0-100% LEL CH4 (4.4% vol.) for OLCT 60 XP IR
6 314 094	Infrared sensor block 0-100% LEL C3H8 (propane) for OLCT 60 XP IR
6 314 095	Infrared sensor block 0-100% LEL C4H10 (butane) for OLCT 60 XP IR
6 314 096	Infrared sensor block 0-100% LEL Isobutane for OLCT 60 XP IR
6 314 098	Infrared sensor block 0-100% LEL GPL (5% vol.) for OLCT 60 XP IR
6 314 099	Infrared sensor block 0-100%vol. CH4 for OLCT 60 XP IR
6 314 100	Infrared sensor block 0-5% vol. CO2 for OLCT 60 XP IR
6 314 101	Infrared sensor block 0-10% vol. CO2 for OLCT 60 XP IR
6 313 710	Sensor block OLCT 60 02 0–30% vol.
6 313 688	Catalytic sensor block NH3 0-5000 ppm for OLCT 60
6 313 707	Sensor block OLCT 60 NH3 0-100 ppm
6 313 708	Sensor block OLCT 60 NH3 0-1000 ppm
6 313 894	Sensor block OLCT 60 NH3 0-5000 ppm

Illustration	Description
6 313 690	Sensor block OLCT 60 CO 0-100 ppm
6 313 691	Sensor block OLCT 60 CO 0-300 ppm
6 313 692	Sensor block OLCT 60 CO 0-1000 ppm
6 313 693	H2-compensated sensor block OLCT 60 CO 0-1000 ppm
6 313 695	Sensor block OLCT 60 H2S 0-30 ppm
6 313 965	Sensor block OLCT 60 H2S 0-30 ppm, no HC-interference
6 313 696	Sensor block OLCT 60 H2S 0-100 ppm
6 313 697	Sensor block OLCT 60 H2S 0-1000 ppm
6 313 698	Sensor block OLCT 60 NH3 0-100 ppm
6 313 699	Sensor block OLCT 60 NH3 0-300 ppm
6 313 700	Sensor block OLCT 60 NH3 0-1000 ppm
6 313 706	Sensor block OLCT 60 H2 0-2000 ppm
6 313 772	Sensor block ADF OLCT 60 methylene – methylene chloride
6 313 773	Sensor block ADF OLCT 60 R12
6 313 774	Sensor block ADF OLCT 60 R134A
6 313 775	Sensor block ADF OLCT 60 MOS

Intrinsically safe sensors

Illustration	Description
6 313 748	Sensor block OLCT 60 SI O2 0–30% vol.
6 313 728	Sensor block OLCT 60 SI NH3 0-100 ppm
6 313 729	Sensor block OLCT 60 SI NH3 0-1000 ppm
6 313 895	Sensor block OLCT 60 SI NH3 0-5000 ppm
6 313 694	H2-compensated sensor block OLCT 60 SI CO 0-1000 ppm
6 313 711	Sensor block OLCT 60 SI CO 0-100 ppm
6 313 712	Sensor block OLCT 60 SI CO 0-300 ppm
6 313 713	Sensor block OLCT 60 SI CO 0-1000 ppm
6 313 716	Sensor block OLCT 60 SI H2S 0-30 ppm
6 313 717	Sensor block OLCT 60 SI H2S 0-100 ppm
6 313 718	Sensor block OLCT 60 SI H2S 0-1000 ppm
6 313 719	Sensor block OLCT 60 SI NO 0-100 ppm
6 313 720	Sensor block OLCT 60 SI NO 0-300 ppm
6 313 721	Sensor block OLCT 60 SI NO 0-1000 ppm
6 313 722	Sensor block OLCT 60 SI NO2 0-10 ppm
6 313 723	Sensor block OLCT 60 SI NO2 0-30 ppm
6 313 727	Sensor block OLCT 60 SI H2 0-2000 ppm
6 313 730	Sensor block OLCT 60 SI HCl 0-30 ppm
6 313 731	Sensor block OLCT 60 SI HCl 0-100 ppm
6 313 724	Sensor block OLCT 60 SI SO2 0-10 ppm
6 313 725	Sensor block OLCT 60 SI SO2 0-30 ppm
6 313 726	Sensor block OLCT 60 SI SO2 0-100 ppm
6 313 734	Sensor block OLCT 60 SI Cl2 0-10 ppm
6 313 746	Sensor block OLCT 60 SI ETO 0-50 ppm
6 313 732	Sensor block OLCT 60 SI HCN 0-10 ppm
6 313 733	Sensor block OLCT 60 SI HCN 0-30 ppm
6 313 736	Sensor block OLCT 60 SI COCl2 0-1 ppm
6 313 740	Sensor block OLCT 60 SI ClO2 0-3 ppm
6 313 735	Sensor block OLCT 60 SI O3 0-1 ppm

Illustration	Description
6 313 737	Sensor block OLCT 60 SI PH3 0-1 ppm
6 313 739	Sensor block OLCT 60 SI HF 0-10 ppm
6 313 738	Sensor block OLCT 60 SI ASH3 0-1 ppm
6 313 747	Sensor block OLCT 60 SI SiH4 0-50 ppm

Chapter 8 | Declaration of EC Conformity

The pages (3) below reproduce the EC statements of compliance for the OLCT 60's series of detectors.

La **Société Oldham S.A.S.**, ZI Est 62000 Arras France, atteste que les
The Company Oldham S.A.S., ZI Est 62000 Arras France, declares that

Détecteurs de gaz OLCT 60
Gas detectors OLCT 60

sont conformes aux exigences des Directives Européennes suivantes:
comply with the requirements of the following European Directives:

I) Directive Européenne ATEX 94/9/CE du 23/03/94 : Atmosphères Explosives
European Directive ATEX 94/9/CE dated from 23/03/94: Explosive Atmospheres

Normes harmonisées appliquées : <i>Harmonised applied Standards</i>	EN 60079 -0:09 EN 60079-1:07 ('d') EN 60079-11:12 ('i') EN 60079-31:09 ('r') EN 60079-26:07 ('Ga')	Protection du matériel-règles générales <i>Equipment protection-general requirements</i>
--	--	---

Normes appliquées : <i>Applied Standards</i>	EN 50271:01 EN 50057:98 EN 50104:02	Appareils de détection de gaz utilisant un logiciel et/ou des technologies numérique <i>(Apparatus for the detection of gases using software and/or digital technologies)</i> Exigences d'aptitude à la fonction des détecteurs de gaz inflammables <i>(Performance requirements of detectors for flammable gases)</i> Exigences d'aptitude à la fonction des détecteurs d'oxygène <i>(Performance requirements for the detection of oxygen)</i>
---	---	---

Attestation CE de Type du matériel :
EC type examination certificate

INERIS 01 ATEX 0027X

Catégorie (category)/Marquage (marking) :

OLCT 60-d et OLCT 60D-d

 **II 2 GD**
Ex d IIC T6 Gb / Ex tb IIIC T85°C Db
 (-20°C<Ta<+60°C)

OLCT 60 IR-d (avec capteur OLCT IR intégré)
(with on-board OLCT IR sensor)

 **II 2 GD**
Ex d IIC T4 Gb / Ex tb IIIC T135°C Db
 (-20°C<Ta<+60°C)

OLCT 60-id (avec cellule intégrée)
(with on-board sensor)

 **II 2 GD**
Ex d ia IIC T4 Gb / Ex tb IIIC T135°C Db
 (-20°C<Ta<+60°C)

Page 1 sur 2 (page 1 out of 2)



OLCT 60D-id (avec cellule déportée)
(with remote sensor)

Sur le transmetteur
(on the transmitter)

 II 2 (I) GD
Ex d [ia Ga] IIC T4 Gb / Ex tb [ia Da] IIIC T135°C Db
(-20°C<Ta<+60°C)

Sur la cellule déportée
(on the remote sensor)

 II 1 GD
Ex ia IIC T4 Ga / Ex ia IIIC T135°C Da
(-20°C<Ta<+70°C)

Notification Assurance Qualité de Production :
Notification of the Production QA

INERIS 00 ATEX Q403

Délivré par l'Organisme notifié numéro 0080 :
Issued by the Notified Body n°0080

INERIS, Parc Alata
60550 Verneuil en Halatte France

II) Directive Européenne CEM 2004/108/CE du 15/12/04: Compatibilité Electromagnétique
European Directive EMC 2004/108/CEE dated from 15/12/04: Electromagnetic Compatibility

Normes harmonisées appliquées : EN 50270:06 for type 1&2 CEM-Appareils de détection de gaz
Harmonised applied Standard EMC- apparatus for the detection of gases

Sécurité de Fonctionnement (Functional Safety)

Niveau d'intégrité de Sécurité
Safety Integrity Level

Capability SIL 2 or SIL 1

L'OLCT 60, pour la détection de l'oxygène ou des gaz combustibles, est conforme aux normes EN 50104, EN 50057 et EN 50271:01. Comme il est indiqué dans le domaine d'application de cette dernière norme, l'OLCT 60 peut être utilisé dans des applications industrielles où est requis un niveau 1 ou 2 d'intégrité de sécurité selon la norme IEC 61508. La période de test de bon fonctionnement ne doit pas être supérieure à 6 ou 3 mois respectivement.

OLCT 60 for the detection of O2 and combustible gases complies with EN 50104, EN 50057 and EN 50271:01. As it is stated in the scope of this last standard, the detector can be used in industrial applications where safety integrity levels 1 or 2 of IEC 61508 are required. The functional test interval period shall not be greater than 6 months or 3 months respectively.

Page 2 sur 2 (page 2 out of 2)

Arras, le 10/07/2014



Oldham S.A.S.
Z.I. EST - CS 20417

62027 ARRAS Cedex - FRANCE
www.oldhamgas.com




Michel Spellemaeker
Director of Product Management



La **Société OLDHAM S.A.S.**, ZI Est 62000 Arras France, atteste que le matériel neuf destiné à être utilisé en Atmosphères Explosives désigné ci-après est conforme aux exigences des Directives Européennes:

Détecteur de gaz OLCT IR

I) Directive Européenne ATEX 94/9/CE du 23/03/94 : Atmosphères Explosives

N° Attestation CE de Type du matériel:

INERIS 03ATEX0141X

Normes européennes de référence:

a) Règles de Construction:

EN 60079-0:06, EN60079-1:04, EN60079-7:04,
EN60079-11:07, EN 61241-0:06, EN61241-1:04

Version OLCT IR E:

 II 2 GD
Ex d e ia IIC T4 Ex tD A21 IP66 T135°C T_{amb}: -50°C to 65°C

Version OLCT IR M25 ou ¾ NPT:

 II 2 GD
Ex d e IIC T4 Ex tD A21 IP66 T135°C T_{amb}: -50°C to 65°C

b) Quand relié aux centrales de détection MX 32, MX 42A, MX 48, MX 43, MX 52, MX 62 ou autres centrales de détection conformes à la Directive ATEX 94/9/CE, Annexe II, Ch1.5

- Performances métrologiques pour la détection des gaz combustibles:

EN 61779-1, EN 61779-4 (gaz de référence Méthane et Propane)

- Exigences et essais pour les appareils utilisant du logiciel:

EN 50271 (version logicielle OLCT IR ≥1.35)

c) Sécurité de fonctionnement pour:
la détection des gaz combustibles

EN50402 (version logicielle OLCT IR ≥1.4)

Processus de développement :

EN61508 (niveau SIL2, phases 1 à 9, 13 à 15)

Données de fiabilité (selon certificat INERIS 03ATEX0141X/02) :

SIL Capability	λ_{DU}	PFD _{avg}	SFF	DC	MTBF
SIL 2	3,5 10 ⁻⁷ /h	1,6 10 ⁻³	90%	72,3%	28 ans

(Note : se reporter à la notice d'utilisation pour les conditions d'utilisation)

N° de la Notification Assurance Qualité de Production de l'usine d'Arras : INERIS 00ATEXQ403

Délivré par l'Organisme notifié sous le numéro 0080:

INERIS, rue Taffanel
60550 - Verneuil en Halatte - France

II) Directive Européenne CEM 2004/108/CE du 15/12/04: Compatibilité Electromagnétique

Normes harmonisées appliquées:

EN 50270:2006 for type 1 & 2

Arras, le 06/10/2013

Michel Spellemaeker



Oldham S.A.S.

Z.I. EST - CS. 20417

62027 ARRAS Cedex - FRANCE

www.oldhamgas.com




Global Director of Product Management

CE_atex_OLCT IR_ind_i

Chapter 9 | Technical Specifications

Dimensional characteristics

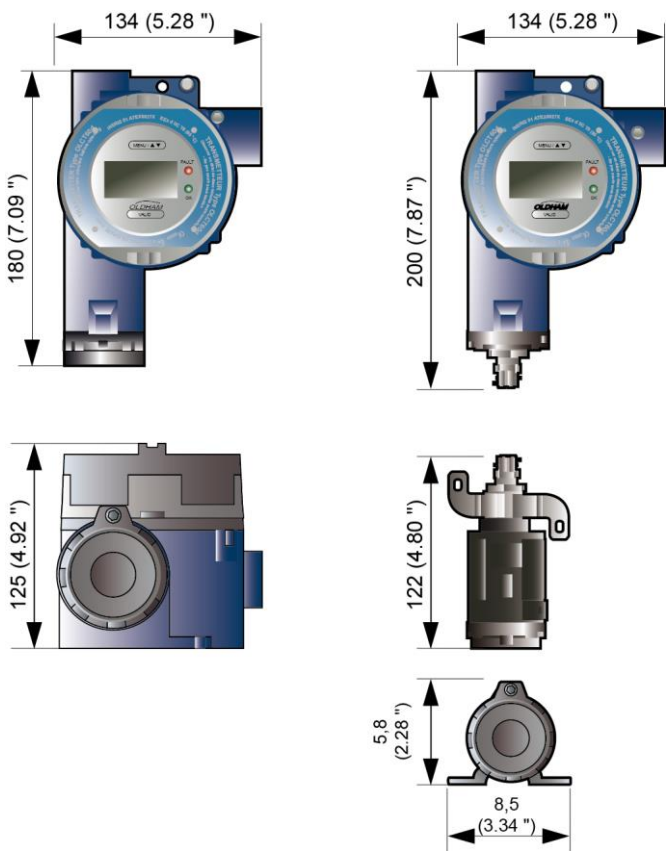


Figure 29: Dimensional characteristics of OLCT 60 detectors with on-board and remote sensor

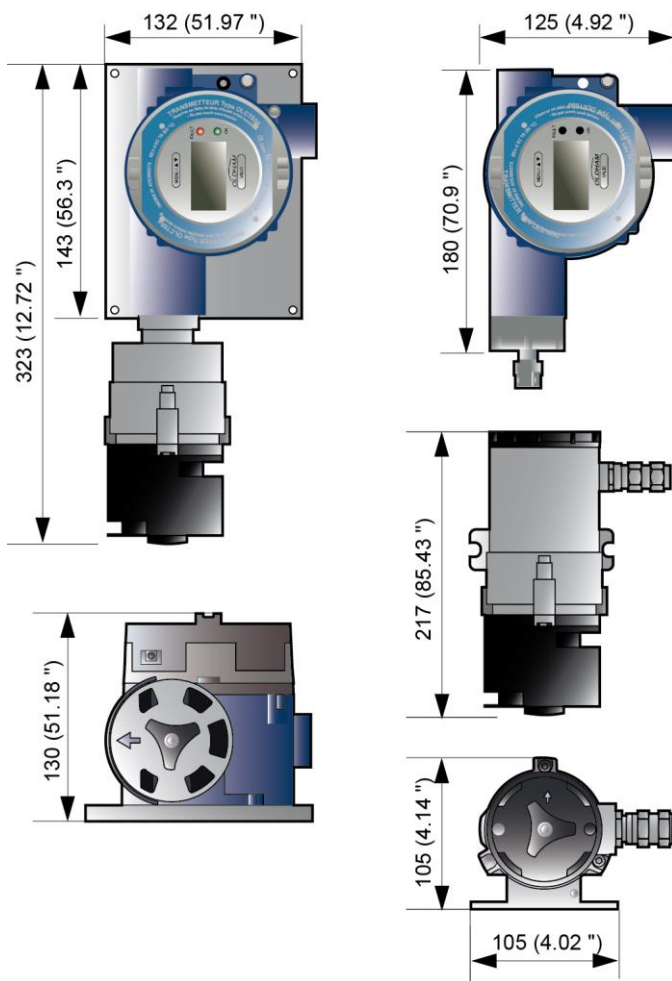


Figure 30: Dimensional characteristics of OLCT 60/OLCT IR detectors with on-board or remote sensor

Complete detector

Power supply to the detector terminals	15 to 30 Vdc
Average consumption based on the sensor block type (active display)	- Catalytic: 140 mA - Electrochemical: 80 mA - XPIR infrared: 120 mA - Infrared OLCT IR: 550 mA
Output current (signal)	- Current source encoded from 0 to 23 mA (non isolated) - Linear 4 to 20 mA current reserved for measurement - Electronic fault or no power supply: 0 mA - Fault: <1 mA - Maintenance mode: 2 mA - Over-range: > 23 mA - Non-ambiguity reading: 20 mA (over-range for combustible gas detectors)
Maximum resistance per cable conductor (with <i>Oldham</i> control unit)	- Catalytic: 32 Ω loop (1 km and 1.5 mm²) - Electrochemical: 48 Ω loop (1.5 km and 1.5 mm²) - XP-IR infrared: 48 Ω loop (1.5 km and 1.5 mm²) - infrared OLCT IR: 8 Ω loop (250 m and 1.5 mm²)
Maximum load resistance	250 Ω (catalytic or electrochemical sensor block) 250 Ω (XP IR sensor block) 250 Ω (XP IR sensor block)
Display	4 digit backlit LCD display - Menu display - Green LED (OK): normal operation mode - Orange LED (FAULT): fault or maintenance
Type of cable	3-wire shielded cable
Cable entry	- M25 cable gland (supplied with the detector before August 2014) - M25 / M20 adaptor in option (P/N 6143552) - M25 / ¾ NPT adaptor in option (P/N 6143584)
Electromagnetic compatibility	EN 50270 compliant
Ingress Protection	IP66

OLCT60-d and OLCT60D-d versions with flameproof sensors

 II 2 GD
Ex d IIC T6 Gb - Ex tb IIIC T85°C Db
T_{amb}: -20 °C à +60°C

OLCT60-id with intrinsic safe on-board sensor

 II 2 GD
Ex d ia IIC T4 Gb - Ex tb IIIC T135°C Db
T_{amb}: -20 °C à +60°C

OLCT60D-id with intrinsic safe remote sensor

On the transmitter  II 2(1) GD
Ex d [ia Ga] IIC T4 Gb
Ex tb [ia Da] IIIC T135°C Db
T_{amb}: -20 °C à +60°C

On the sensor  II 1 GD
Ex ia IIC T4 Ga
Ex ia IIIC T135°C Da
T_{amb}: -20 °C à +70°C

OLCT 60 IR-d version with on-board OLCT IR

 II 2 GD
Ex d IIC T4 Gb - Ex tb IIIC T135°C Db
T_{amb}: -20 °C à +60°C



Note: data above include the cable gland supplied by default along with the OLCT 60 (until August 2014). Starting from August 2014, make sure to use a compatible cable gland compatible and at least flameproof certified (d).

Weight	▪ 1.6 kg without sensor block ▪ 2.1 kg with sensor block ▪ 4.1 kg with OLCT IR block
Material	▪ Painted aluminum with epoxy polyester coating
Operating temperature	▪ Electronics: -25 °C à +55 °C ▪ Sensors: sensor dependent
Storage temperature	▪ Electronics: -25 °C à +60 °C ▪ Sensors: sensor dependent

Measuring sensors

Gas		Measuring range (ppm)	ADF sensor	SI sensor	Temperature range (°C)	% HR	Accuracy (ppm)	Average Life Expectancy (months)	Resp. Time T50/T90 (s)	Storage time and conditions
Combustible gas	Infrared OLCT IR	0-100% LEL	■		-25 to +55	0 – 99	+/- 5% (CH4) +/- 3% (HC)	>60	9/15 (CH4) (e) 7/8 (CH4) (f)	(a)
	Infrared XP IR	0-100% LEL	■		-25 to +55	0 – 95	+/- 5%	48	11/30 (CH4)	(a)
	Catalytic	0-100% LEL	■		-25 to +55	0 - 95	+/-1 % LEL (from 0 to 70% LEL)	40	6/15 (CH4)	(b)
Ash3	Arsine	1,00		■	-20 to +40	20 – 90	+/- 0,05	18	30/120	(a)
Cl2	Chlorine	10,0		■	-20 to +40	10 – 90	+/- 0,4	24	10/60	(a)
ClO2	Chlorine Dioxide	3,00		■	-20 to +40	10 – 90	+/- 0,3	24	20/120	(a)
CO	Carbon Monoxide	100 300 1000	■ ■ ■	■ ■ ■	-20 to +50	15 – 90	+/- 3 (range 0-100)	40	15/40	(a)
CO2	Carbon Dioxide	0-5% vol.	■		-25 to +55	0 – 95	+/- 3%	48	11/30	(a)
COCl2	Phosgene	1,00		■	-20 to +40	15 – 90	+/- 0,05	12	60/180	(c)
ETO	Ethylene Oxide	30,0		■	-20 to +50	15 – 90	+/- 1,0	36	50/240	(a)
H2	Hydrogen	2000	■	■	-20 to +50	15 – 90	+/- 5%	24	30/50	(a)
H2S	Hydrogen Sulphide	30,0 100 1000	■ ■ ■	■ ■ ■	-25 to +50	15 – 90	+/- 1.5 (range 0-30)	36	15/30	(a)
HCl	Hydrogen Chloride	30,0 100		■	-20 to +40	15 - 95	+/- 0.4 (range 0-30)	24	30/150	(a)
HCN	Hydrogen Cyanide	30,0		■	-25 to +40	15 - 95	+/- 0.3 (range 0-10)	18	30/120	(c)
HF	Hydrogen Fluoride	10,0		■	-10 to +30	20 – 80	+/- 5%	12	40/90	(c)
NH3	Ammonia	100 1000 5000	■ ■ ■	■ ■ ■	-20 to +40	15 – 90	+/- 5 +/- 20 +/- 150 or 10%	24	50/90 50/90 50/120	(a)
NO	Nitrogen Monoxide	100 300 1000	■ ■ ■	■ ■ ■	-20 to +50	15 – 90	+/- 2 (range 0-100)	36	10/30	(a)
NO2	Nitrogen Dioxide	30,0			-20 to +50	15-90	+/-0,8	24	30/60	(a)
O2	Oxygen	0-30% vol.	■	■	-20 to +50	15 – 90	0.4% Vol. (from 15 to 22% O2)	28	6/15	(a)
O3	Ozone	1,00		■	0 to +40	10 – 90	+/- 0.03 (from 0 to 0,2 ppm) +/- 0.05 (from 0.2 to 1 ppm)	18	40/120	(c)
PH3	Phosphine	1,00		■	-20 to +40	20 – 90	+/- 0.05	18	30/120	(a)
SiH4	Silane	50,0		■	-20 to +40	20 – 95	+/- 1.0	18	25/120	(a)
SO2	Sulphur Dioxide	10,0 30,0 100		■ ■ ■	-20 to +50	15 – 90	+/- 0.7 (range 0-10)	36	15/45	(a)
CH3Cl	Chloro-methane	500	■		-20 to +55	20 – 95	+/- 15% (from 20 to 70% PE)	40	25/90	(d)
CH2Cl	Dichloro-methane	500	■		-20 to +55	20 – 95	+/- 15% (from 20 to 70% PE)	40	25/90	(d)
Freon R12		1 % vol.	■		-20 to +55	20 – 95	+/- 15% (from 20 to 70% PE)	40	25/90	(d)

Gas		Measuring range (ppm)	ADF sensor	SI sensor	Temperature range (°C)	% HR	Accuracy (ppm)	Average Life Expectancy (months)	Resp. Time T50/T90 (s)	Storage time and conditions
Freon R22		2000	■		-20 to +55	20 – 95	+/- 15% (from 20 to 70% PE)	40	25/90	(d)
Freon R123		2000	■		-20 to +55	20 – 95	+/- 15% (from 20 to 70% PE)	40	25/90	(d)
FX56		2000	■		-20 to +55	20 – 95	+/- 15% (from 20 to 70% PE)	40	25/90	(d)
Freon R134 a		2000	■		-20 to +55	20 – 95	+/- 15% (from 20 to 70% PE)	40	25/90	(d)
Freon R11		1 % vol.	■		-20 to +55	20 – 95	+/- 15% (from 20 to 70% PE)	40	25/90	(d)
Freon R23		1 % vol.	■		-20 to +55	20 – 95	+/- 15% (from 20 to 70% PE)	40	25/90	(d)
Freon R143 a		2000	■		-20 to +55	20 – 95	+/- 15% (from 20 to 70% PE)	40	25/90	(d)
Freon R404 a		2000	■		-20 to +55	20 – 95	+/- 15% (from 20 to 70% PE)	40	25/90	(d)
Freon R507		2000	■		-20 to +55	20 – 95	+/- 15% (from 20 to 70% PE)	40	25/90	(d)
Freon R410 a		1000	■		-20 to +55	20 – 95	+/- 15% (from 20 to 70% PE)	40	25/90	(d)
Freon R32		1000	■		-20 to +55	20 – 95	+/- 15% (from 20 to 70% PE)	40	25/90	(d)
Freon R407 c		1000	■		-20 to +55	20 – 95	+/- 15% (from 20 to 70% PE)	40	25/90	(d)
Freon R408 a		1000	■		-20 to +55	20 – 95	+/- 15% (from 20 to 70% PE)	40	25/90	(d)
Ethanol		500	■		-20 to +55	20 – 95	+/- 15% (from 20 to 70% PE)	40	25/60	(d)
Toluene		500	■		-20 to +55	20 – 95	+/- 15% (from 20 to 70% PE)	40	25/60	(d)
Isopropanol		500	■		-20 to +55	20 – 95	+/- 15% (from 20 to 70% PE)	40	25/60	(d)
2-Butanone (MEK)		500	■		-20 to +55	20 – 95	+/- 15% (from 20 to 70% PE)	40	25/60	(d)
Xylene		500	■		-20 to +55	20 – 95	+/- 15% (from 20 to 70% PE)	40	25/60	(d)

- a) +4°C to +20°C.
20 % to 60 % HR
1 bar ± 10 %
maximum 6 months

b) -25°C to +60°C.
20 % to 60 % HR
1 bar ± 10 %
maximum 6 months

c) +4°C to +20°C.
20 % to 60 % HR
1 bar ± 10 %
maximum 3 months

d) -20°C to +50°C.
20 % to 60 % HR
1 bar ± 10 %
maximum 6 months
- e) with weather cover

f) without weather cover

Chapter 10 | Special instructions for use in explosive environments and functional safety

General comments

The OLCT 60 sensors conform to the requirements of European Directive ATEX 94/9/CE relating to explosive Dust and Gas atmospheres. On account of their metrological performance as tested by the notified body INERIS, the OLCT 60 transmitter detectors intended for the measurement of explosive gases are classed as safety devices according with the European Directive and may, therefore, contribute to limiting the risks of explosion.

The information given in the following sections should be respected and taken into account by the manager of the site where the equipment is installed. As far as the aim of improving the health and safety of workers who are exposed to the risks of explosive atmospheres is concerned, refer to European Directive ATEX 1999/92/CE.

Metrological performance for the detection of flammable gases or oxygen

OLCT 60 gas detectors are compliant with:

- EN 50271:01 (Electrical apparatus for the detection and measurement of combustible gases, toxic gases or oxygen – Requirements and tests for apparatus using software and/or digital technologies)

OLCT 60 combustible gas detectors equipped with a VQ1 catalytic sensor are compliant with:

- EN 50054 (Electrical apparatus for the detection and measurement of combustible gases. General requirements and test methods)
- EN 50057 (Electrical apparatus for the detection and measurement of combustible gases. Performance requirements for Group II apparatus indicating up to 100% lower explosive limit)

OLCT 60 oxygen detectors equipped also comply with:

- EN 50104 (Electrical apparatus for the detection and measurement of oxygen. Performance requirements and test methods)

These detectors are classed as safety devices according to ATEX 94/9/CE and may, therefore, contribute to limiting the risks of explosion. For this to be so, they must be connected to Oldham controllers type MX 15, MX 32, MX 42A, MX 43, MX 48, MX 52 or MX 62, or otherwise connected to central units with 4-20 mA inputs conforming to section 1.5 of Annex II of ATEX Directive 94/9/CE and compatible with their characteristics (see transfer curve).

Cable inlets:

They shall be flameproof certified for use in explosive atmospheres. They shall be (or better than) IP66 certified and shall be installed in accordance with standard IEC/EN 60079-14 (whatever edition is in force), and possibly in accordance with further requirements related to the local or national regulations. The cables should be suitable for use at a temperature equal to or greater than 80°C.

Threaded joints

Threaded joints of the OLCT 60 may be lubricated to maintain the flameproof mode of protection. Only lubricants that are non-hardening, non-corrosive and without volatile solvents may be used. Warning: silicone based lubricants are strictly forbidden, since they contaminate the OLCT 60 detector elements.

Functional Safety

The safety function of the OLCT 60 detector is the detection of flammable gases using catalytic technology or the detection of oxygen using an electrochemical cell and a 4-20 mA current output proportional to the gas concentration expressed as a percentage of LEL (from 0 to 100% LEL) or expressed as a percentage of volume of oxygen (from 0 to 30% vol. O₂). In the event of a failure, the output current will assume a fallback value less than or equal to 1 mA or greater than or equal to 23 mA. The safety function is no longer valid on warm up and during the time it takes for the sensor to stabilize. During this period, the output current shall be frozen at 2 mA (maintenance mode).

Reliability data

The analysis reported by INERIS, report no. CGR 74448 of July 6th 2006, has allowed the assessment of the annual failure rate of OLCT 60 combustible gas detectors equipped with a VQ1 catalytic sensor: $\lambda_{DU} \text{ annual} = 4.42 \cdot 10^{-2}$.

OLCT 60 gas detector for the detection of oxygen and combustible gases complies with EN 50104, EN 50057 and EN50271:01. As mentioned in the scope of this last standard, the detector can be used in industrial applications where safety integrity levels 1 or 2 according to IEC 61508 are required. The functional test interval period shall not be greater than 6 months or 3 months respectively.

Please note: the calculated failure rates are strictly valid over the actual life time of the sensitive elements (limited time interval, 3 to 5 years). Past this term, the failure rate is no longer significant due to aging of the measuring sensors.

Chapter 11 | Fault and error codes

Errors (E xx)

Errors are exclusively generated when a communication trouble occurs between the sensor and the internal board. Errors are identified in the following format *Exx* (whereas *xx* corresponds to the error code). No corrective action is possible for the operator. In this case, sensors must be returned to the manufacturer or his local agent.

Number	Cause
35 to 39	Communication error with the sensor
40 to 42	Communication error with the infrared sensor block (OLCT IR).



Figure 31: Example of communication errors

Faults (dEF xx)

A fault signal alerts about a material fault (voltage, sensor etc...). Here below is the list of possible faults. Please note that the occurrence of more than one fault is not displayed by showing a sequence of the reference code numbers but rather by adding them up to each other.

If, for example, a zero fault (code 1) and a sensitivity fault (code 2) are detected, the display will show the fault code 3. In this case the analogic output signal will equal 1 mA.

N°	Cause
1	Zero fault after calibration
2	Sensitivity fault after calibration
4	Sensor worn out after calibration
8	Memory problem.
16	Excessive negative signal.
32	Measuring beyond upper range.
64	Fault after an internal control
256	Line voltage too low.
512	RAM memory problem.
1024	Memory programming problem.
ABS	No sensor block.



Figure 32: Display example of a fault code 3



EUROPEAN PLANT AND OFFICES

Z.I. Est – rue Orfila CS 20417 – 62027 Arras Cedex FRANCE

Tél: +33 (0)3 21 60 80 80 – Fax: +33 (0)3 21 60 80 00

Website: <http://www.oldhamgas.com>

AMERICAS

Tel: +1 713-559-9280

Fax: +1 281-292-2860

americas@oldhamgas.com

ASIA PACIFIC

Tel: +86-21-3127-6373

Fax: +86-21-3127-6365

sales@oldhamgas.com

EUROPE

Tel: +33-321-608-080

Fax: +33-321-608-000

info@oldhamgas.com